TRANSACTIONS
OF THE
ILLUMINATING ENGINEERING SOCIETY

FOUNDED IN LONDON 1909

INCORPORATED 1930

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The I.E.S. Council and Committees

Session 1954-1955

Council

President :—E. C. LENNOX (*Fellow*).

Vice-Presidents:— H. G. CAMPBELL, M.A. (*Fellow*), C. S. CAUNT (*Fellow*), W. E. HARPER, B.Sc. (Eng.), Ph.D., A. G. PENNY (*Fellow*), J. W. STRANGE, Ph.D., A.R.C.Sc.

Members of Council:—

Elected Members:—
D. S. ALLOM, A. D. S. ATKINSON, N. BOYDELL, C. DYKES BROWN, T. CATTEN, A. W. GOSTT, F. M. HALE, H. HEWITT, A. G. HIGGINS, R. G. HOPKINSON, H. G. JENKINS, G. E. V. LAMBERT, R. A. LOVELL, J. S. MCCULLOCH, A. H. OLSON, W. ROBINSON, N. C. SLATER, C. C. SMITH, J. S. SMYTH, W. T. F. SOUTER, W. S. STILES, D. A. STRACHAN, D. L. TABRAHAM, H. E. G. WATTS.

Ex-Officio Representatives of Centres:—
D. E. BEARD (*Bath and Bristol*), F. W. HAYNES (*Birmingham*), W. A. COOPER (*Cardiff*), T. M. CHRISTIE (*Edinburgh*), A. S. BONN (*Glasgow*), F. W. RICKETTS (*Gloucester and Cheltenham*), J. R. BARDSLEY (*Leeds*), B. V. ROWE (*Leicester*), G. W. A. ILLINGWORTH (*Liverpool*), W. C. G. BAILEY (*Manchester*), T. E. DELLOW (*Newcastle*), A. ROBERTS (*Nottingham*), C. J. CHISHOLM (*Sheffield*).

Hon. Treasurer:—
E. B. SAWYER.

Hon. Secretary:—
H. C. WESTON.

Hon. Editor of Transactions:—C. R. BICKNELL, B.Sc.

All Past-Presidents of the Society are *ex-officio* Members of Council.

Committees

GENERAL PURPOSES COMMITTEE: E. C. Lennox (*President*), W. R. Stevens (*Past-President*), H. G. Campbell, C. S. Caunt, W. E. Harper, A. G. Penny, J. W. Strange (*Vice-Presidents*), E. B. Sawyer (*Hon. Treasurer*), H. C. Weston (*Hon. Secretary*), W. A. Cooper (*Cardiff Centre*), J. S. Smyth (*Manchester Centre*).

PAPERS COMMITTEE: D. S. Allom, A. D. S. Atkinson, T. Catten, H. G. Jenkins, G. E. V. Lambert, A. H. Olson, W. Robinson, D. A. Strachan, J. W. Strange.

EDUCATION COMMITTEE: C. Dykes Brown, F. M. Hale, H. Hewitt, A. G. Higgins, D. A. Strachan, J. W. T. Walsh.

CODE COMMITTEE: R. G. Hopkinson, W. T. F. Souter, F. C. Smith, W. S. Stiles, D. L. Tabraham, H. C. Weston

CENTRES JOINT COMMITTEE: One representative from each Centre. Council's Representatives: N. Boydell, H. Hewitt, A. G. Higgins.

AWARDS JUDGING COMMITTEE: J. G. Holmes, J. S. McCulloch, J. M. Waldram, D. A. Strachan, W. Robinson, C. R. Bicknell.

(The President, Hon. Secretary and Hon. Treasurer are *ex-officio* members of all committees.)

Secretary :—G. F. COLE, 32, Victoria Street, London, S.W.1.

Report of the Council

(January 1 to December 31, 1954)

The Council has the honour to present its report upon the affairs of the Society during the year ended December 31, 1954, this year being the forty-sixth in the life of the Society.

Officers and Members of Council for Session 1954-55

In accordance with the procedure laid down in the Articles and By-laws of the Society, nominations made by the Council to fill vacancies for the Session 1954-55 were circulated to Corporate Members who were given an opportunity to make additional nominations. As no such additional nominations were received the following were duly elected :—

President: Mr. E. C. Lennox.

Vice-Presidents: Mr. H. G. Campbell, Mr. C. S. Caunt, Dr. W. E. Harper, Mr. A. G. Penny, Dr. J. W. Strange.

Hon. Treasurer: Mr. E. B. Sawyer.

Hon. Secretary: Mr. H. C. Weston.

Hon. Editor of the Transactions: Mr. C. R. Bicknell.

Ordinary Members of Council: Mr. D. S. Allom, Mr. A. W. Gostt, Mr. A. G. Higgins, Mr. G. E. V. Lambert, Mr. A. H. Olson, Mr. C. C. Smith, Mr. J. S. Smyth, Mr. H. E. G. Watts.

The following were appointed to represent their respective Centres on the Council for the Session 1954-55 :—

Bath and Bristol: Mr. D. E. Beard. *Birmingham*: Mr. F. W. Haynes. *Cardiff*: Mr. W. A. Cooper. *Edinburgh*: Mr. T. M. Christie. *Glasgow*: Mr. A. S. Bonn. *Gloucester and Cheltenham*: Mr. F. W. Ricketts. *Leeds*: Mr. J. R. Bardsley. *Leicester*: Mr. B. V. Rowe. *Liverpool*: Mr. G. W. A. Illingworth. *Manchester*: Mr. W. C. G. Bailey. *Newcastle*: Mr. T. E. Dellow. *Nottingham*: Dr. A. Roberts. *Sheffield*: Mr. C. J. Chisholm.

Attendance at Council Meetings

The attendance of ordinary members of Council and representatives of Centres at Council meetings during the year is given in the following table :—

(a) Elected Members

Name	Possible attend.	Actual attend.	Name	Possible attend.	Actual attend.
D. S. Allom	8	3	D. A. Strachan	8	8
A. D. S. Atkinson	8	7	D. L. Tabraham	8	5
N. Boydell	8	7	S. Anderson	5	4
C. Dykes Brown	8	8	B. F. W. Besemer	5	3
T. Catten	8	2	P. Hartill	5	0
F. M. Hale	8	4	T. S. Jones	5	0
H. Hewitt	8	6	A. R. McGibbon	5	0
R. G. Hopkinson	8	3	C. W. M. Phillips	5	0
H. G. Jenkins	8	4	A. W. Gostt	3	2
R. A. Lovell	8	2	A. G. Higgins	3	3
J. S. McCulloch	8	7	G. E. V. Lambert	3	3
W. Robinson	8	6	A. H. Olson	3	2
N. C. Slater	8	5	C. C. Smith	3	3
W. T. F. Souter	8	4	J. S. Smyth	3	1
W. S. Stiles	8	2	H. E. G. Watts	3	2

To be presented at the Annual General Meeting of the Society to be held at the Royal Society of Arts, John Adam Street, London, W.C.2, at 6 p.m. on Tuesday, May 10, 1955.

(b) CHAIRMEN OF CENTRES (*ex officio*)

Centre	Possible attend.	Actual attend.	Centre	Possible attend.	Actual attend.
Bath and Bristol	8	8	Leeds	8	4
Birmingham	8	7	Leicester	8	1
Cardiff	8	1	Liverpool	8	1
Edinburgh	8	0	Manchester	8	5
Glasgow	8	0	Newcastle	8	3
Gloucester and Cheltenham	8	0	Nottingham	8	2
			Sheffield	8	4

Standing Committees

The Standing Committees as from October, 1954, were constituted as follows :—

GENERAL PURPOSES COMMITTEE: E. C. Lennox (*President*), H. G. Campbell, C. S. Caunt, W. E. Harper, A. G. Penny, J. W. Strange (*Vice-Presidents*), W. R. Stevens (*Past-President*), E. B. Sawyer (*Hon. Treasurer*), H. C. Weston (*Hon. Secretary*), W. A. Cooper (*Cardiff Centre*), Mr. J. S. Smyth (*Manchester Centre*).

PAPERS COMMITTEE: D. A. Strachan (*Chairman*), D. S. Allom, A. D. S. Atkinson, T. Catten, H. G. Jenkins, G. E. V. Lambert, A. H. Olson, W. Robinson, J. W. Strange. Co-opted: J. S. McCulloch, J. G. Holmes, A. H. Young.

EDUCATION COMMITTEE: J. W. T. Walsh (*Chairman*), C. Dykes Brown, F. M. Hale, H. Hewitt, J. T. MacGregor-Morris, D. A. Strachan. Co-opted: G. F. Freeman.

CODE COMMITTEE: H. C. Weston (*Chairman*), R. G. Hopkinson, W. T. F. Souter, F. C. Smith, W. S. Stiles, D. L. Tabraham.

CENTRES JOINT COMMITTEE: One representative from each Centre; three ordinary members of Council—N. Boydell, H. Hewitt, A. G. Higgins.

AWARDS JUDGING COMMITTEE: J. G. Holmes, J. S. McCulloch, J. M. Waldram, D. A. Strachan, W. Robinson, C. R. Bicknell.

The President, Hon. Treasurer and Hon. Secretary are *ex officio* members of all committees.

The Council records its thanks to members who have given their time and assistance to committee work during the year.

Meetings in London

Papers presented and discussed at sessional meetings in London are shown in the following table :—

Date	Subject	Author
January 12th	Studies in Interior Lighting	J. M. Waldram
February 9th	Design and Application of Flameproof Lighting Equipment	D. A. Strachan
March 9th	Flicker Discomfort in Relation to the Lighting of Buildings	J. B. Collins and R. G. Hopkinson
April 13th	Illuminants for Colour Reproduction and Printing	H. M. Cartwright
October 12th	Presidential Address	E. C. Lennox
November 9th	The Lighting of Small and Medium Sized Shops and Stores	R. L. C. Tate
December 14th	Maintenance of Lighting Installations	W. Robinson and J. W. Strange

The Council expresses its thanks to the Lighting Service Bureau for facilities made available to the Society during the year for the holding of meetings. Meetings were

also held at the Royal Institution, and the London School of Hygiene and Tropical Medicine.

Informal meetings were also held during the year, and such meetings have now become an established and popular feature of the London programme. The Council records its thanks to all those who have contributed to the success of these meetings as well as of the normal sessional meetings.

Centres and Groups

During the year most of the Centres and Groups arranged and carried out interesting programmes of papers, lectures and visits, some of which were exceptionally well attended. Unfortunately, however, some of the smaller Groups found it difficult to carry on, the Groups at Bradford and Huddersfield being eventually disbanded and the members re-absorbed into the parent Centre at Leeds.

It will be recalled that most of the present Centres were set up many years ago as Groups and that wherever a Group has been formed it has been the hope that in due course it would attain sufficient members to become a Centre; it is gratifying that so many of the earlier Groups are in fact now flourishing Centres. Some of the Groups have not developed in this way and have been disbanded; the work done by members of such former Groups is, however, greatly appreciated and particular mention must be made of Mr. E. Wood, who was responsible for the Huddersfield Group from the time of its formation until its disbandment this year. During the year the Leeds Centre has extended its activities to the Hull area where there is now an active section of the society.

One most encouraging development during the year is the formation of a new Centre of the Society in the Transvaal, the first branch of the Society to be formed outside the United Kingdom. As mentioned in the Report of the Council for last year, permission had been granted for the formation of the Transvaal Group at the end of 1953; the first meeting of the new Group was held in February, 1954. Before the end of the year under review the membership had grown to 50 plus 11 Sustaining Members and Centre status was accorded. The Council congratulated the officers of the new Centre, whose chairman was Mr. F. L. Cator, on the outstanding progress made during the very short existence of the Centre.

The activities of all Centres and Groups depend largely on the enthusiasm of their officers and committees and particularly on the chairman and honorary secretaries. These offices—particularly in the larger Centres—make many demands upon the time of the individuals who undertake them. The Council, and the Society as a whole, is indebted to those who have carried out these duties during the year. At December 31 the chairman and honorary secretaries of the respective Centres and Groups were as follows :—

	Chairman	Hon. Secretary
Bath and Bristol	D. E. Beard	H. A. Turner
Birmingham	F. W. Haynes	W. J. P. Watson
Cardiff	W. A. Cooper	J. D. Callaway
Edinburgh	T. M. Christie	C. Couper
Glasgow	A. S. Bonn	A. M. Rankin
Gloucester and Cheltenham	F. W. Ricketts	F. J. Chappell
Leeds	J. R. Bardsley	J. W. Howell
Leicester	B. V. Rowe	A. E. Bird
Liverpool	G.W.A. Illingworth	J. L. McCauley
Manchester	W. C. G. Bailey	T. L. Robinson
Newcastle	T. E. Dellow	R. J. Fothergill
Nottingham	A. Roberts	W. G. Whitaker
Sheffield	C. J. Chisholm	E. G. R. Taylor
Transvaal	F. L. Cator	R. S. Yates

	Chairman	Hon. Secretary
North Lancashire	H. Carpenter	H. Wilcock
Stoke-on-Trent	R. J. Jones	J. P. Oliver
Swansea	A. V. Sinclair	S. G. Gorman
Teeside	K. Graham	W. J. Knowlson

During the year most of the Centres were visited by the president. It is hoped that every Centre will also be visited in each session by one of the vice-presidents and, during the year under review, many visits by these officers have been made. Centres are again reminded to make arrangements for such visits when compiling their programmes for the session, that is, before the beginning of the session. During the session all officers have many calls upon their time and, for those who live away from London, much time is spent in travelling and it is not always possible for them to make arrangements to visit a Centre at short notice.

Summer Meeting

The Society's fourth summer meeting was held at Southport from May 18 to 21 and was attended by a record number of visitors both from this country and overseas. Previous summer meetings have owed much to the chairmanship of the summer meeting committee by Mr. W. R. Stevens and the Council would like to express its appreciation of the fact that in addition to his able performance of the normally heavy duties of president he also took on the responsibility of the Southport meeting during his term of office. Thanks are also expressed to Mr. F. J. Burns and Mr. G. W. A. Illingworth of the Liverpool Centre, who were responsible for many of the detailed arrangements at Southport.

Adhering to previous practice the programme was arranged to allow adequate time for the discussion of papers though naturally with a larger attendance more delegates wished to participate.

The meeting began with a series of visits to installations in Liverpool on the afternoon of Tuesday, May 18, followed in the evening by a civic reception at Southport. On the following morning the meeting was officially opened by the Mayor of Southport after which a paper on "Lamps and their uses" was presented by Dr. J. N. Aldington. During the afternoon two papers were presented, "Street lighting in a London suburb" by Mr. A. T. Durbridge and "Lighting for plant growth" by Mr. A. E. Canham. Thursday morning was taken up by visits to the Preston factories of Siemans Electric Lamps and Supplies Ltd. and to two new schools, the arrangements for the latter being made by the Architects' Department of the Lancashire County Council. These visits, and the arrangement whereby one whole morning during the meeting is devoted to them, proved popular and the Society is grateful to those who extended hospitality on these occasions. During Thursday afternoon a series of four papers dealing with the economics of four different types of factory installations were presented and discussed. These papers proved exceptionally interesting not only because of the subject but because they were given by factory or consulting engineers and not by people in the lighting industry. The papers on the Friday were "The decorative approach to commercial lighting" by M. André Claude of Paris and "Home lighting" by Mr. A. H. Young and Mr. C. J. Misselbrook.

One of the features of the Society's summer meetings has always been the opportunities provided for social intercourse and informal discussion. In spite of the fact that it is not easy to get papers of the necessary high standard there is always the temptation to pack the programme with as many technical sessions as possible. This has always been resisted and it is generally agreed that the broad pattern which has now evolved is the most acceptable and agreeable to those taking part in the meeting. The initial "get-together" on the first evening, whether it be as a civic reception or in some other form, is a good start to the meeting. Other informal events are provided

by the visits, including those arranged for the ladies, and by the annual dinner which is held during the meeting. At the annual dinner on the Thursday evening the toast of the Society was proposed by M. Jean Chappat of Paris, the response being made by the president, Mr. W. R. Stevens. The toast of the guests was proposed by Mr. J. F. Stanley (vice-president) and the reply made by Mr. D. H. Kendon, chairman of the Merseyside and North Wales Electricity Board.

A departure from the usual pattern of summer meetings was the inclusion of a display of new lighting equipment during the Wednesday evening. This proved to be a most popular feature and is likely therefore to become a regular feature of future meetings.

The Council wishes to express its appreciation of all the work done by the summer meeting and papers committees and by all others who helped to make the Southport meeting a success. Arrangements are now being made for the next meeting in 1956.

Publications

In 1954 the normal quota of 10 issues of the Transactions was published containing 17 papers and 357 pages. In addition to papers presented to London sessional meetings and at the Summer Meeting the following written contributions were also published:—

Spectrophotometry of radiation from sun and sky, by E. R. Cooper and M. C. Probine.
Spectral distribution of radiation from sun and sky, by J. N. Hull.
The "reflected component" in daylighting design, by A. Dresler.
An empirical formula for the computation of the indirect component of daylight factor, by R. G. Hopkinson, J. Longmore and P. Petherbridge.
Two supplementary studies on glare, by R. G. Hopkinson and P. Petherbridge.
Preliminary survey of colour preferences in television, by M. Gilbert.

The Council would like to express its thanks to Dr. Harper for acting as Honorary Editor of the Transactions for a number of years and to Mr. C. R. Bicknell, who has now taken on these duties.

At the beginning of 1954 *Light and Lighting* increased its page size and made further improvements in its content and presentation. There is no doubt that this change has met with the unanimous approval of members and that *Light and Lighting*, which is sent to all members under a bulk subscription arrangement with the publishers (The Illuminating Engineering Publishing Company, Ltd.), is a valuable asset to the Society and is important to the lighting industry as a whole.

During the year the current edition of the I.E.S. Code for the Lighting of Building Interiors became out of print. A new edition is in course of preparation.

The Council has been conscious for some time of the need for a more suitable document to explain the objects of the Society to interested people, including prospective members. During the year an attractive brochure for this purpose was published.

Society Awards

The Leon Gaster Memorial Premium awarded each year for the best paper presented to the Society and published in the Transactions was gained this year by Mr. J. M. Waldram for his paper entitled "Studies in interior lighting."

The Silver Jubilee Commemoration Award was made to Mr. J. Lynes for a paper entitled "A method of designing symmetrical specular reflectors for small light sources." The Council would again remind younger members of the existence of this award which is available only to members under the age of 26 years, and asks older members to encourage entries for this award so that young men and women in the industry may gain experience in the preparation of technical papers.

INCOME AND EXPENDITURE ACCOUNT

EXPENDITURE

1953		£ s. d.	£ s. d.
£	Administration Expenses :—		
2,258	Salaries and State Insurance	2,306 13 8	
106	Staff Superannuation Scheme	85 0 0	
376	Rent and Rates	387 12 0	
73	Lighting and Heating	72 18 0	
91	Telephone	96 12 10	
323	Printing and Stationery	361 8 2	
209	Postage	149 13 5	
66	Travelling Expenses	104 15 0	
276	Sundry Office Expenses	409 3 10	
3,778			3,973 16 11
277	Meetings in London		219 15 6
1,132	Expenditure of Centres and Groups		1,077 10 8
37	Audit Fee		36 15 0
5,224			5,307 18 1
1,087	Cost of Printing Transactions, Reprints, etc.		1,658 19 6
97	Expenditure on Annual Dinner *less* Sale of Tickets ...		– – –
—	Expenditure on Summer Meetings *less* Sale of Tickets ...		26 12 4
	Illuminating Engineering Publishing Co., Ltd.—		
	Cost of " Light and Lighting "	1,529 2 0	
	Less Contribution towards administration expenses ...	500 0 0	
1,014			1,029 2 0
43	Contributions to Kindred Societies		47 15 0
21	Transfer to Leon Gaster Memorial Fund		– – –
7,486			8,070 6 11
724	Balance, being excess of Income over Expenditure ...		436 6 8
£8,210			£8,506 13 7

BALANCE SHEET

1953		£ s. d.	£ s. d.
£	Capital Account :—		
8,784	Balance at 31st December, 1953	9,508 1 9	
—	*Less* Transfer to Reserve for Special Expenses ...	200 0 0	
8,784		9,308 1 9	
724	*Add* Excess of Income over Expenditure for the year	436 6 8	
9,508		9,744 8 5	
539	*Less* Depreciation of Investments	411 14 9	
8,969			9,332 13 8
	Reserve for Special Expenses :—		
	Transfer from Capital Account...	200 0 0	
—	*Less* Brochure published during year	53 0 6	
			146 19 6
257	Creditors		499 1 3
£9,226			£9,978 14 5

E. B. SAWYER (*Hon. Treasurer*)
H. C. WESTON (*Hon. Secretary*)

FOR THE YEAR ENDED 31st DECEMBER, 1954

INCOME

1953		£	s.	d.
£				
7,565	Subscriptions and Fees	7,595	1	0
399	Sales of publications	554	14	10
246	Interest on Investments	253	4	6
–	Surrender Value of Staff Superannuation Policies	103	13	3
£8,210		£8,506	13	7

31st DECEMBER, 1954

1953		£	s.	d.	£	s.	d.
£	Investments at cost :—						
£2,020 14s. 7d.	3½% War Loan	2,059	15	0			
£1,250	3% Defence Bonds	1,250	0	0			
£1,500	2½% Defence Bonds	1,500	0	0			
£500	2½% National War Bonds	500	0	0			
£1,500	3% Savings Bonds	1,501	15	3			
£500	3% British Transport Guaranteed Stock	488	4	6			
£1,000	3½% Defence Bonds	1,000	0	0			
£500	Abbey National Building Society ...	500	0	0			
8,300		8,799	14	9			
539	*Less* Depreciation ... ... (*Market Value 31.12.54, £8,388*)	411	14	9			
7,761					8,388	0	0
52	Debtors				66	8	4
1,413	Balance at Bankers and Cash in Hand				1,524	6	1
£9,226					£9,978	14	5

Auditors' Report.—We have examined the above Accounts with books and vouchers, and certify same to be correct in accordance therewith and that the Balance Sheet exhibits a true and correct view of the Society's affairs according to the information and explanations given to us.

ROBERT J. WARD & CO., *Chartered Accountants,*
3, ROBERT STREET, ADELPHI, W.C.2

Dated this 19th Day of January, 1955.

RECEIPTS & PAYMENTS ACCOUNTS

LEON GASTER

	£	s.	d.
Balance, 1st January, 1954	256	15	4
War Loan Interest	8	1	0
	£264	16	4

NATIONAL ILLUMINATION

	£	s.	d.
Balance, 1st January, 1954	359	12	9
War Loan Interest	10	10	0
	£370	2	9

INTERNATIONAL ILLUMINATION

	£	s.	d.
Balance, 1st January, 1954	457	10	6
Interest on Investments	14	0	0
	£471	10	6

TROTTER-PATERSON

	£	s.	d.
Balance, 1st January, 1954	367	4	6
Defence Bond Interest	12	5	0
	£379	9	6

JOHN S. DOW

	£	s.	d.
Balance, 1st January, 1954	2,075	10	0
Interest on Investments	69	1	6
	£2,144	11	6

FOR THE YEAR ENDED 31st DECEMBER, 1954

MEMORIAL FUND

	£ s. d.	£ s. d.
Premiums paid		10 10 0
Balance, 31st December, 1954 :—		
Cash at Bank	17 13 2	
£230 3½% War Loan at cost	236 13 2	
(*Market Value 31.12.54, £201*)		254 6 4
		£264 16 4

COMMITTEE FUND

	£ s. d.	£ s. d.
Balance, 31st December, 1954 :—		
Cash at Bank	65 14 3	
£300 3½% War Loan at cost	304 8 6	
(*Market Value 31.12.54, £262*)		370 2 9
		£370 2 9

CONGRESS FUND

	£ s. d.	£ s. d.
Balance, 31st December, 1954 :—		
Cash at Bank	67 2 0	
£300 3½% War Loan at cost	304 8 6	
(*Market Value 31.12.54, £262*)		
£100 3½% Defence Bonds at cost	100 0 0	
		471 10 6
		£471 10 6

MEMORIAL LECTURE FUND

	£ s. d.	£ s. d.
Balance, 31st December, 1954 :—		
Cash at Bank	29 9 6	
£350 3½% Defence Bonds at cost	350 0 0	
		379 9 6
		£379 9 6

LEGACY FUND

	£ s. d.	£ s. d.	£ s. d.
Printing			11 5 0
Balance at 31st December, 1954 :—			
£916 11s. 1d. 3½% War Loan, at cost ...	876 5 0		
£1,000 3% Savings Bonds, at cost ...	970 0 0		
(*Market Value 31.12.54, £1,776*)		1,846 5 0	
£200 3½% Defence Bonds, at cost ...		200 0 0	
Cash at Bank		87 1 6	
			2,133 6 6
			£2,144 11 6

Membership

At the beginning of the year the Council unanimously endorsed a proposal from the President's Panel that Honorary Membership be conferred upon Sir John Parsons (President, 1921-23). At the request of Sir John the presentation of the certificate of Honorary Membership was made at the Council meeting on March 9. The citation on the certificate records that the distinction was awarded " in recognition of his many and valuable services to the Society from its foundation in 1909, his scientific studies of the problems of vision and his writings thereon, his constant furtherance of researches on lighting and vision, and in acknowledgment of his eminence in ophthalmology." In expressing his appreciation of the honour conferred upon him Sir John said that it was a source of satisfaction to him that the Society had continued its interest in physiological matters and he stressed the wisdom of the Society continuing to do so.

During the year the Society suffered the loss of one of its most popular members, Mr. R. O. Ackerley, who was President in 1942. Mr. Ackerley had been most active on Council and committees right up to the time of his sudden death. The Council also

Total Membership

(As at December 31, 1954)

	Fellows	Corporate Members	Overseas Members	Students	Total	Sustaining Members
London	94	608	—	52	754	49
Centres :—						
Bath & Bristol...	3	50	—	—	53	2
Birmingham ...	9	218	—	6	233	26
Cardiff	2	62	—	2	66	2
Edinburgh ...	4	42	—	—	46	5
Glasgow ...	5	67	—	—	72	6
Gloucester & Cheltenham ...	—	32	—	1	33	—
Leeds	5	196	—	8	209	3
Leicester ...	2	32	—	—	34	—
Liverpool ...	2	108	—	3	113	8
Manchester ...	4	134	—	1	139	8
Newcastle ...	3	85	—	—	88	5
Nottingham ...	3	67	—	5	75	1
Sheffield ...	2	62	—	6	70	1
Transvaal ...	2	44	2	2	50	11
Groups :—						
N. Lancashire ...	2	50	—	—	52	—
Stoke-on-Trent	—	21	—	1	22	—
Sussex	6	29	—	—	35	1
Swansea ...	—	20	—	—	20	—
Tees-side ...	1	20	—	—	21	—
Ireland	2	23	—	—	25	—
Overseas ...	9	99	67	2	177	2
Total ...	160	2069	69	89	2387	130

record with regret the death of another Fellow, Mr. P. S. Barton, who emigrated to New Zealand a few years ago.

During the year three new Fellows were elected, the total number now being 160. During the year many new applications for membership were considered by the Council, the net increase during the year being 48. It will be recalled that last year, for the first time in the history of the Society, a loss in membership occurred; the Council is therefore particularly gratified with the increase shown during 1954.

The activities of the Society are, of course, of benefit not only to individuals but also to the lighting industry as a whole, and many firms and organisations show their appreciation of the work done by the Society by being Sustaining Members. To these firms and organisations, a list of whom is appended to this report, the Council expresses its thanks.

Register of Lighting Engineers

During the year the Fellowship and Registration Board considered 11 new applications for inclusion in the Register, which now contains the names of 245 members of the Society.

The view has been expressed that a more suitable title might be found, and that the Register be more widely known and used so that those whose names are included therein might thereby receive fuller professional recognition. The Council is giving attention to this matter.

Education

Once again courses in illuminating engineering for City and Guilds Certificates have been limited to London and one or two other large cities. Students who cannot conveniently attend courses at technical colleges where facilities are available are reminded that correspondence courses for the Intermediate and Final Grades are now available; and many students have qualified by this means. In the examinations held in May there were 43 successes in the Intermediate examination, nine in the Final (Papers 1 and 2) and 13 in the Final (Papers 1 and 3).

Finance

The accounts once again show a small excess of income over expenditure attributable to an increase in the sales of publications and economies in the office organisation. The cost of a much needed supplementary heating system in the office was met from income. A small grant was made from the reserve set up last year to finance the brochure published to aid the Society's development.

The balance-sheet shows an improvement in the value of investments when compared with the previous year, a tendency which should continue.

Conclusion

The Council feels that the year has been a satisfactory one and would once again place on record its keen appreciation of the loyalty to, and the efforts on behalf of, the Society of the Secretary, Mr. G. F. Cole, and his staff.

Appendix 1

Sustaining Members

(As at December 31, 1954)

J. Aikman and Co., Ltd., 1a, Hill Street, Edinburgh.
Aladdin Lighting, Ltd., P.O. Box 3491, Johannesburg.
Allom Brothers Ltd., Lombard Road, Merton, S.W.19.
Aurora Lamps Ltd., Old Kilpatrick, Glasgow.

T. Beadle and Co., Ltd., 3/5, Castle Street, Hull, Yorks.
Benjamin Electric Ltd., Brantwood Road, Tottenham, N.17.
City of Birmingham Education Department, Council House, Margaret Street, Birmingham.
Bolton Corporation, Lighting Department, Marsden Road, Bolton, Lancs.
British Electric Lamps, Ltd., Spencer Hill Road, S.W.19.
British Electrical Development Association, 2, Savoy Hill, W.C.2.
British Electricity Authority, British Electricity House, Great Portland Street, W.1.
British General Electric Co. (Pty) Ltd., Magnet House, Loveday Street, Johannesburg.
British Optical Association, 65, Brook Street, W.1.
British Thomson-Houston Co., Ltd., Crown House, Aldwych. W.C.2.
Cartwright, J. T. and Sons, Ltd., 195, St. Vincent Street, Glasgow, C.2.
Chance Bros. and Co., Ltd., Glass Works, Smethwick, Birmingham.
Claude Neon Lights of New Zealand Ltd., 91, Hobson Street, Auckland, C.1, New Zealand.
Courtney, Pope (Electrical) Ltd., Amhurst Park Works, N.15.
E. Clegg and Sons, Ltd., Shore Mills, Littleborough, Lancs.
R. and A. G. Crossland, Ltd., Cartbridge Lane, Walsall, Staffs.
Cryselco, Ltd., 231, Strand, W.C.2.
George Davidson and Co., Ltd., Teams Glass Works, Gateshead-on-Tyne 8.
Hubert Davies and Co., Ltd., Hudaco House, 7, Rissik Street, Johannesburg.
Dominec (Pty) Ltd., P.O. Box 3269, Johannesburg.
Docker Bros., Rotton Park Street, Ladywood, Birmingham 16.
Dodd and Oulton, Ltd., 8-12, Stanley Street, Liverpool 1.
Downes and Davies, Ltd., 1-9, Stanley Street, Liverpool 1.
Drake and Gorham Wholesale Ltd., 77, Long Acre, W.C.2.
Eastern Electricity Board, Whersted, Ipswich, Suffolk.
Eastern Gas Board, Abbey Gardens, Westminster, S.W.1.
East Midlands Electricity Board, Mapperley Hall, Nottingham.
Corporation of the City and Royal Burgh of Edinburgh, City Chambers, Edinburgh 1.
Edison Swan Electric Co., Ltd., 155, Charing Cross Road, W.C.2.
Edmundsons Electric Co., Ltd., 24-30, Gillingham Street, S.W.1.
E.G.S. Company Ltd., 10-12, Trafalgar Street, Newcastle-on-Tyne 1.
Ekco-Ensign Electric Ltd., 45, Essex Street, Strand, W.C.2.
Electrical Components, Ltd., Components House, Ludgate Hill and Lionel Street, Birmingham 3.
Electric Lamp Manufacturers Association, 25, Bedford Square, W.C.1.
Electric Street Lighting Apparatus Co., Ltd., The Foundary, Canterbury, Kent.
George Ellison, Ltd., Wellhead Lane Works, Perry Bar, Birmingham 22b.
Engineering and Lighting Equipment Co., Ltd., Sphere Works, St. Albans, Herts.
Engineering Service Installations, Ltd., 258, Grays Inn Road, W.C.1.
Falk, Stadelmann and Co., Ltd., 91, Farringdon Road, E.C.1.
Falks Electrical Supplies (S.A.) (Pty.) Ltd., 17, Heidelberg Road, Village Main, Johannesburg.
Foster Electrical Supplies Ltd., Morden Road, South Wimbledon, S.W.19.
B. French, Ltd., Mill Lane, Kidderminster, Worcs.
Fulford Brown Bros. (1929) Ltd., Crystex Works, Regent Parade, Birmingham 1.
Gas Council, Gas Industry House, 1, Grosvenor Place, S.W.1.
General Electric Co., Ltd., Magnet House, Kingsway, W.C.2.
Donald Grant and Sons, Ltd., St. James's Place, Edinburgh.
Hailwood and Ackroyd, Ltd., Beacon Works, Morley, Leeds.
W. T. Hellaby and Co., Ltd., 80, Dale End, Birmingham.
Heyes and Co., Ltd., Water Heyes Electrical Works, Wigan, Lancs.
Hirst, Ibbetson and Taylor, Ltd., 47-53, Chapel Street, Salford 3, Lancs.
Hivac Ltd., Greenhill Crescent, Harrow-on-the-Hill, Middlesex.
Holland House Electrical Co., Ltd., 221, St. Vincent Street, Glasgow, C.2.
Holophane, Ltd., Elverton Street, Vincent Square, S.W.1.
Humber Ltd., Ryton-on-Dunsmore, Coventry.
Hume, Atkins and Co., Ltd., New Icknield Way, Letchworth, Herts.
Imperial Chemical Industries Ltd. (Metals Division), Kynoch Works, Witton, Birmingham 6.
Imperial Chemical Industries Ltd. (Paints Division), Wexham Road, Slough, Bucks.
Imperial Chemical Industries Ltd. (Plastics Division), Black Fan Road, Welwyn Garden City, Herts.
Inductive Appliances, Ltd., 18, Dean Street, Newcastle-on-Tyne.
J. A. Jobling and Co., Ltd., Wear Glass Works, Sunderland.

James Kilpatrick and Son, Ltd., Kelvin House, River Cart Walk, Paisley.
Knightshades Ltd., Derby Road Works, Montague Road, Edmonton, N.18.
Linolite Ltd., Mill Works, Malmesbury, Wilts.
Littlewoods Pools, Central Maintenance Department, Cases Street, Liverpool 1.
Corporation of Liverpool, Town Clerk's Office, Municipal Buildings, Liverpool 2.
London Electric Firm, Ltd., Brighton Road, South Croydon, Surrey.
London Electricity Board, 46-7, New Broad Street, E.C.2.
Joseph Lucas Ltd., Gt. King Street, Birmingham.
Merseyside and N. Wales Electricity Board, Electricity House, Love Lane, Pall Mall, Liverpool.
Metallic Seamless Tube Co., Ltd., Ludgate Hill, Birmingham, 3.
Metropolitan-Vickers Electrical Co., Ltd., 1-3, St. Paul's Churchyard, E.C.4.
Metropolitan-Vickers (S.A.) Pty., Ltd., Maritime House, Loveday Street, Johannesburg.
Midland Electric Installation Co., Cyprus Works, Upper Villiers Street, Wolverhampton.
Midlands Electricity Board, Headquarters, Mucklows Hill, Halesowen, Worcs.
Morgan Crucible Co., Ltd., Battersea Church Road, S.W.11.
Municipal Electricity Department, Singapore.
New Era Lighting Industries (Pty.) Ltd., 127, Anderson Street, Johannesburg.
Newey and Eyre, Ltd., 18, Newhall Hill, Birmingham.
North Eastern Electricity Board, Carliol House, Newcastle-on-Tyne 1.
North Western Electricity Board, Cheetwood Road, Manchester.
Oldham Corporation Street Lighting Committee Lighting Dept., Gas Street, Oldham, Lancs.
Pearce and Cutler, Ltd., Bridge Street, Broad Street, Birmingham.
Philips Electrical Ltd., Century House, Shaftesbury Avenue, W.C.2.
S.A. Philips (Pty.) Ltd., Upper Railway Road, Cnr. Herb Street, New Doornfontein, Johannesburg.
F. H. Pride, Ltd., Clapham High Street, S.W.4.
Prudential Assurance Co., Ltd., 142, Holborn Bars, E.C.1.
Revo Electric Co., Ltd., Britannia Works, Tividale, Tipton, Staffs.
John Riley and Son (Electrical) Ltd., 281-283, Attercliffe Common, Sheffield 9.
Robinson, King and British Challenge Glazing Co., Ltd., Marshgate Lane, Stratford, E.15.
Rogers, G. S. (Pty.) Ltd., 9, Leyds Street, Johannesburg.
Rowe Bros. and Co., Ltd., Pall Mall, Liverpool 3.
Rowlands Electrical Accessories, Ltd., 157, Hockley Hill, Birmingham 18.
Satchwell and Gittings, Ltd., Tantarra Electrical Works, Walsall, Staffs.
James Scott and Co., Ltd., 175, St. Vincent Street, Glasgow, C.2.
Siemens Brothers British (Pty.), Ltd., 20, Simmonds Street South, Johannesburg.
Siemens Electric Lamps and Supplies, Ltd., 38-39, Upper Thames Street, E.C.4.
Sign Components, Ltd., 121-3, Camden High Street, N.W.1.
Simplex Electric Co., Ltd., Broadwell, Oldbury, Birmingham.
Simplex Electric Co. (S.A.) (Pty.), Ltd., Box 751, Springs, Transvaal.
Herman Smith, Ltd., Reliance Works, Dudley, Worcs.
Wm. Allan Smith and Co., Ltd., East Silvermills, Edinburgh 4.
W. H. Smith and Co. (Electrical Engineers), Ltd., 12, York Street, Manchester 2.
South East Scotland Electricity Board, 53, Melville Street, Edinburgh.
South Eastern Electricity Board, 10, Queen's Gardens, Hove 3, Sussex.
Southern Electricity Board, Southern Electricity House, Bath Road, Maidenhead, Berks.
South Wales Electricity Board, St. Mellons, Cardiff.
South West Scotland Electricity Board, 62, Dalziel Drive, Glasgow.
South Western Electricity Board, Electricity House, Colston Avenue, Bristol.
W. H. Stone and Co. (Cardiff). Ltd., Service House, 16-17, Hill's Terrace, Cardiff.
Strand Electric and Engineering Co., Ltd., 24, Floral Street, W.C.2.
Wm. Sugg and Co., Ltd., Ranelagh Works, Chapter Street, S.W.1.
Sun Electrical Co., Ltd., 118-120, Charing Cross Road, W.C.2.
Thorn Electrical Industries, Ltd., 105-9, Judd Street, W.C.1.
Thorn Electrical Industries (S.A.) Pty., Ltd., P.O. Box 75, Industria, Johannesburg.
F. W. Thorpe, Ltd., Thorlux Works, Welby Road, Hall Green, Birmingham 28.
Troughton and Young, Ltd., Imperial Court, Knightsbridge, S.W.3.
Tucker and Edgar, Berkeley Works, Berkeley Road, N.W.1.
Verity's, Ltd., Plume and Victoria Works, Aston, Birmingham 6.
Walker Bros., Ltd. (Electrical Engineers), Temple Row, Birmingham 1.

Walsall Conduits, Ltd., Excelsior Works, West Bromwich, Staffs.
J. Walton (Electrical) Ltd., 333, Chapel Street, Salford, Lancs.
Wardle Engineering Co., Ltd., Old Trafford, Manchester.
J. M. Webber and Co., Ltd., Weblite House, 244, Tottenham Court Road, W.1.
Whitworth Electric Lamp Co., Ltd., 6-12, Gorleston Street, West Kensington, W.14.
A. J. Wright (Electrical) Ltd., 67-69, Victoria Street, Liverpool 1.
Yorkshire Electricity Board, Wetherby Road, Scarcroft, Thorner, nr. Leeds.
Z. Electric Lamp and Supplies Co., Ltd., 21, Newman Street, W.1.

Appendix 2

I.E.S. Representatives on Outside Committees

(As at December 31, 1954)

NATIONAL ILLUMINATION COMMITTEE ..	Dr. J. N. Aldington, Mr. E. C. Lennox, Mr. J. G. Holmes, Mr. L. H. McDermott, Mr. J. M. Waldram
COUNCIL FOR CODES OF PRACTICE ...	Mr. G. F. Cole
Codes of Practice Committee for Buildings ...	Mr. J. G. Holmes
Codes of Practice Committee for Electrical Engineering ...	Mr. W. R. Stevens
PARLIAMENTARY AND SCIENTIFIC COMMITTEE ...	Mr. H. C. Weston
CITY AND GUILDS OF LONDON INSTITUTE ADVISORY COMMITTEE ON ILLUMINATING ENGINEERING ...	Mr. W. R. Stevens
COMMITTEES OF THE BRITISH STANDARDS INSTITUTION:	
Electric Lamps and Lampholders for Aircraft ...	Mr. A. G. Penny
British National Committee of the I.E.C. ...	Dr. J. N. Aldington
Cinematograph Industry Standards Committee ...	Mr. H. C. Weston
Cinematograph Electrical Equipment ...	Mr. S. S. Beggs
Cinema Studio Lighting, Lamps and Fittings ...	Mr. S. S. Beggs
Cinematograph Carbon-Arc Equipment ...	Dr. F. S. Hawkins
Ripple Content in Electricity Supply to Studio Equipment ...	Dr. F. S. Hawkins
Auditorium and Safety Lighting for Cinemas and Theatres ...	Mr. S. S. Beggs
Auditorium Lighting (Drafting) ...	Mr. S. S. Beggs
Safety Signs for Cinemas and Theatres ...	Mr. S. S. Beggs
Stage Electrical Equipment ...	Mr. E. E. Faraday
Code of Practice Committee on Street Lighting ...	Mr. E. Stroud Mr. J. M. Waldram
Code of Practice Committee on Street Lighting (Drafting)	Mr. E. Stroud
Flameproof Fittings for Lighting Purposes ...	Mr. H. S. Allpress
Low Pressure Gas Mantles ...	Mr. F. C. Smith
Metal Windows ...	Mr. G. F. Cole
Illumination Industry Standard Committee ...	Mr. J. M. Waldram, Mr. J. G. Holmes, Mr. L. H. McDermott, Dr. J. N. Aldington, Mr. E. C. Lennox
Nomenclature for Illumination ...	Mr. W. Robinson, Mr. G. F. Cole
Lighting Fittings ...	Mr. W. T. F. Souter, Mr. A. W. Jervis
Diffusing Materials ...	Dr. J. W. T. Walsh
Fittings for Double-capped Tubular Lamps ...	Mr. V. F. Beuttell
Street Lighting ...	Mr. E. Stroud, Mr. J. M. Waldram
Electric Lamps ...	Mr. W. T. F. Souter
Electric Lamps for Navigation Purposes ...	Mr. A. G. Penny
Tungsten Lamps ...	Mr. A. G. Penny
Discharge Lamps ...	Mr. A. G. Penny
Electric Signs ...	Mr. E. F. Martin
Road Traffic Control Signals ...	———
Ultra-Violet Light ...	Mr. A. G. Penny
Surface Colours for Signalling Purposes ...	Mr. J. G. Holmes
Colour Terminology ...	Mr. G. T. Winch
Photographic Electronic Flash Equipment ...	Mr. H. W. Cumming
Construction of Road Traffic Signs ...	Mr. F. C. Smith
Illumination of Signs ...	Mr. F. C. Smith
Photographic Industry Standards Committee ..	Mr. A. W. Gostt
Equipment for Head Protection against Radiation ..	Mr. H. C. Weston
Rear Lamps and Reflex Reflectors ..	Mr. H. F. Stephenson

The Lighting of Small and Medium-Sized Shops and Stores

By R. L. C. TATE

Summary

A shop lighting installation must be related not only to the size and shape of the shop but also to the class of merchandise displayed and the type of customer. Current techniques of window lighting are dealt with in some detail, and in particular the problems arising from the necessity of concealing the lamps, the use of dark or translucent louvres and the reduction of daylight window reflections. Where shop interiors are concerned one of the chief points at issue is the choice between general and localised lighting. Recommendations are made of suitable colours of light sources and the importance of blending the light of filament and fluorescent lamps is emphasised. The current fashion for dark ceilings is discussed together with the importance of wall lighting to display the merchandise and relieve the gloomy effect otherwise created by this method of lighting.

The paper gives a brief survey of after-hour lighting in some representative shopping centres made in 1949-50 and the spring of 1954. The paper closes with a brief résumé of some of the types of lamps and equipment now available for shop and shop window lighting.

(1) Introduction

The purpose of this paper is to review progress in the lighting of smaller shops since the beginning of the relaxation of wartime lighting restrictions in 1949, and to indicate possible developments. Great ingenuity has been shown and many interesting lighting features are to be found in these smaller stores and specialist shops, where in the past five years a radical change has taken place in the whole conception of lighting. In only a few cases before the war was the lighting designed as a whole; in most cases specialist lighting was confined to the window and that used for the interior was equally suitable for an office, bank or public room. Now, largely as a result of the introduction of open-backed windows, shop interiors are becoming display areas in their own right, and although in some cases purely fashionable considerations have, perhaps, played too great a part, the value of good lighting as a means of increasing sales inside the shop is generally realised not only by architects and designers but increasingly by the shopkeepers themselves.

(2) Purpose of Shop Lighting: Windows

(2.1) General Considerations

The purpose of a shop window is, of course, to help the shopkeeper to sell his goods, but both the lighting and the type of display will be influenced by a number of considerations, of which perhaps the most important is whether more emphasis is put upon direct selling of merchandise from the window, or on the effect of clever presentation of the goods to advertise the shop. The former consideration is most generally accepted in this country, and leads to the adoption of lighting calculated to show off the goods in the most natural way possible; the latter allows of a more bizarre treatment, possibly including strong coloured lighting and elaborate spot-lighting and shadow effects. In addition, the class of customer and the type of goods will also affect the lighting technique; drapers' shops in superior shopping areas, for

The author is with the E.L.M.A. Lighting Service Bureau, London. The manuscript of this paper was first received on July 29, 1954, and in revised form on September 30, 1954. The paper was presented at a meeting of the Society held in London on November 9, 1954.

example, will usually employ lighting which gives a dramatic presentation of their goods, grocers and food shops in almost all areas are concerned to light the shop itself as much as the merchandise in order to present an appearance of cleanliness and thus attract customers.

(2.2) The Effect of Fashion on Fittings Design

Changes of fashion, too, tend to affect the design of both window and interior lighting more than they did when lighting was seldom more than an afterthought. Typical of this is the streamlining of the appearance of the familiar mirrored-glass shop window reflector, even when no fluorescent lighting is installed. Where their place has not been taken by internally mirrored reflector lamps, used bare or in specially designed housings, they have often been replaced by reflectors designed to imitate these lamps in appearance, but to house normal general service lamps. Since these reflectors are usually constructed of spun metal and are made as small as possible in order to look elegant, they do little more than screen the lamps from view, and give very little real light control. Many more lamps must be used to give the same illumination on the display than if properly designed reflectors were used, and in consequence the economy over reflector lamps is much reduced. In many of these housings, where no real reflector is provided, it is likely that 75-watt reflector lamps will gradually replace the lamps for which they were originally designed.

(2.3) Relation Between Artificial and Natural Lighting

Although most shopkeepers do not vary the style of their window lighting during daylight and after-closing hours, there is a very good case for studying the correct lighting balance for each occasion. During the day, for example, when the window is flooded with flat white natural daylight, fluorescent lamps have little or no effect on the display, and the only effective artificial light must come from very concentrated spotlighting of salient features. If at night no change is made, the spotlighting alone will tend to produce a dramatic "soot and whitewash" effect which may not show the merchandise to the best advantage. In this case it would be worthwhile to use general fluorescent lighting at night to restore the daytime lighting balance. On the other hand, coloured light which can be most effective at night is scarcely noticeable in a window flooded with natural daylight, and could well be switched off during the day.

(3) Purpose of Shop Lighting: Interiors

(3.1) General Considerations

It is the writer's firm conviction that in the majority of shops the lighting should be designed primarily to set off the merchandise, and should not only be regarded either as an architectural embellishment or as an unavoidable necessity. This theory, which has gained much ground of late, has led to a number of apparently revolutionary changes in lighting and interior decoration—dark ceilings have appeared in a number of shops, spotlighting of counters and showcases is becoming increasingly common, and the use of special lighting on walls, primarily to display merchandise but also sometimes to increase the sense of space, is by no means the novelty it was in the past. All these features are most commonly found in the smaller, specialist types of shops rather than in the large stores, many of which are treated in much the same way as large offices or factories where a considerable floor area is lighted by means of rows of lighting fittings, arranged symmetrically over the ceilings without any consideration for the disposition of counters or displays. Partly as a result of this outlook, architects are showing a marked preference for filament lamps for lighting the merchandise itself, using fluorescents for background lighting only and sometimes even providing a dark ceiling.

(3.2) Use of Decorative Fittings

In certain classes of shops the creation of an attractive atmosphere is even more important than emphasis on the goods, and here lighting fittings of a purely decorative nature are often found. In shops selling fashion goods, for example, it is common to find elaborate crystal chandeliers which, although they add little to the actual illumination of the room, often effected by means of indirect fluorescent lighting, add to its attractiveness and lend an air of opulence. Lighted showcases and discreet spotlighting of selected displays are still commonly found in such shops.

(3.3) Use of Commercial Fittings

Conventional commercial lighting fittings are used in the majority of shops and are particularly suitable in food shops, where the main requirement is a general flood of light to emphasise cleanliness and to produce a welcoming atmosphere. Indeed, it is always preferable to use standard types of fittings rather than to devise "specials" for the job, but where many designers go astray is in the siting of the fittings. It may be taken as a general rule that where beams and similar structural features exist, they should be used as far as possible to conceal the light sources. Far more use, too, could be made of simple plywood or hardboard baffles.

(4) Technique and Methods: Windows

(4.1) Choice of Light Source

Some classes of merchandise are best lighted by means of tungsten filament lamps only; a few look well under the light of fluorescent lamps alone, but the great majority respond best to a mixture of both light sources. Apart from this consideration the choice will depend upon whether a dramatic effect is required. A dramatic presentation, with strong highlights and well defined shadows, can be produced by means of filament spot and flood lamps. Fluorescent lamps shed a soft diffuse light which produces subdued highlights and luminous shadows.

(4.2) The Effect of District Brightness

The general brightness of the locality is one of the most important factors affecting the amount of light it is necessary to provide. Where there is little competition from street lighting and neighbouring windows, a dramatic presentation using one or two spotlamps only can be made, but in the shopping centre of a busy street the competition from other windows forces the shopkeeper to increase the brightness of his own. An illumination of about 100 lm./ft.^{2} can be produced in a medium-sized window by means of 100-watt filament lamps in mirrored-glass reflectors spaced one foot apart behind a pelmet. This intensity is adequate for most shopping centres in large suburbs or medium-sized towns and was common practice before the war. Although about half the wattage of fluorescent lighting is needed to produce a comparable effect in most cases, filament spotlamps will increase the total consumption of the window to about the same figure.

(4.3) Concealment of Lamps and use of Reflectors

Although far too many shops, even in main shopping centres, still display bare fluorescent lamps at the tops and even more frequently at the sides of their windows, a practice which cannot be too strongly condemned, screening devices, ranging from simple baffles and pelmets to elaborate louvred ceilings are commonly used. Mounting fluorescent lamps behind a white-painted pelmet or baffle is bound to result in over-lighting the upper third of the window, so it is becoming more and more usual to find shop window reflectors used to punch the light down on to the goods. Many of these are, however, finished in stoved-enamel and have scarcely more light controlling qualities than the white-painted pelmet; it is recommended that specular reflectors be used wherever possible. Lamps mounted vertically at the sides of the window also help to increase the spread of light but they should be carefully screened. (Fig. 1.)

(4.4) The Use of Louvres

In single aspect windows of the type commonly found in large stores concealment of light sources is seldom difficult, but where, as in the majority of shops, it is possible to see into the window from the side, cross baffles are necessary to conceal the lamps from the oblique viewpoint. The design of these baffles sometimes shows a considerable lack of thought, for they are frequently either too shallow to prevent a view of the lamps at normal viewing angles or, where egg-box louvring is used on an angle fitting, the horizontal fins serve no useful purpose and merely cut off some of the light from merchandise displayed on the floor of the window near the glass. It is recommended that such transverse fins should have a cut-off angle of not less than 30 deg. or preferably 45 deg. (Fig. 2.)

It is interesting to note two opposing techniques in the use of louvred ceilings. In one, the louvre itself is regarded as a decorative feature and plays a conspicuous part in the design, in the other everything possible is done to make it inconspicuous and to ensure that the whole of the observer's attention is focused on the merchandise. In the first, white-painted metal fins are normally used, but a number of types of translucent plastic louvres have recently appeared, which materially increase the brightness of the ceiling and would seem to defeat the object of the louvre altogether. This type of ceiling is most frequently seen in the windows of shops selling luxury goods, where it is often used in conjunction with open-backed windows and where the louvre section may take an eccentric shape. Where filament lamps are also used they are generally mounted below the louvre in elegant housings, or partly recessed in the soffits surrounding it in "eyeball" or "gimbal" type mountings.

At the other end of the scale are those who believe that not only ought the light sources to be concealed but that the brightness of the ceiling should be reduced to as low a level as possible. They argue that since the merchandise in the window is the only thing that matters, nothing else should be allowed to distract the observer's attention from it. Carried to its logical conclusion this suggests a matt black louvre, but, since the ordinary egg-box arrangement would undoubtedly absorb a great deal of light, its place has been taken by a few deep baffles with concentrating reflectors mounted between them, so that as little light as possible falls on the black surface. This is most effective at night although by day the large areas of dark paint tend to exaggerate window reflections.

(4.5) Arcades

Whilst the lighting of straight-sided arcades presents few problems, it is not easy to conceal the lamps in those of irregular shape. The generally accepted method is to use fluorescent lamps in louvred troffers recessed into a false ceiling and supplemented by filament spotlamps, but if this technique is used care must be taken to avoid too conspicuous an arrangement of the lighting fittings on the ceiling. A random arrangement may irritate and distract customers, but can scarcely be avoided if the fittings are lined up with the window glass. It is advisable, therefore, to plan the fittings in lines following the main axis of the window, without much reference to the shape of the arcade itself (Fig. 3).

(4.6) Island Windows

No one looking critically at shop window installations can fail to remark the almost total disregard of lighting principles which obtains in island windows where, although lamps on the side nearest the observer are carefully screened by pelmets, few attempts are made to hide those on the further side, which are allowed to shine straight into the eyes. The simple solution is to use an inner pelmet, but it is more common to find that, if anything has been done, a louvred ceiling has been provided. A very

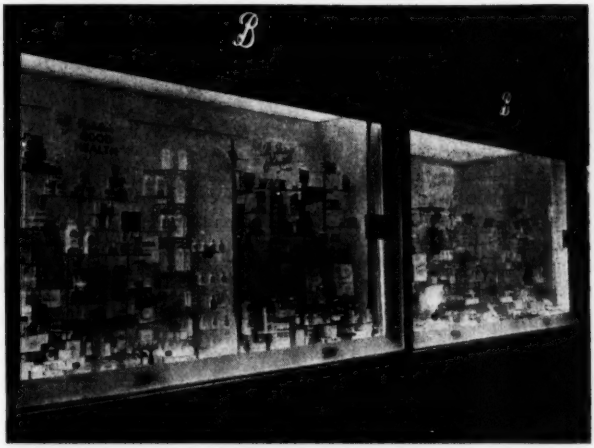

Fig. 1. A good example of fluorescent lighting. Lamps are installed above the louvred ceiling and behind the 'picture frame' to give side and bottom lighting.

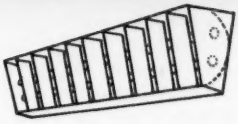

Fig. 2. Fluorescent fittings designed for pelmet lighting should have transverse louvres. Longitudinal louvres are unnecessary and reduce the amount of light at the front of the window.

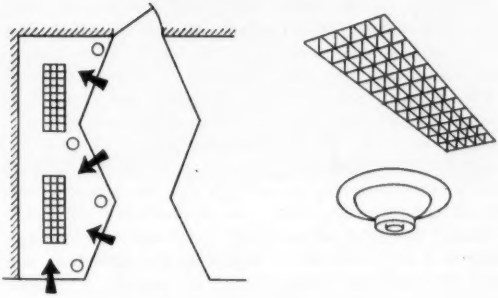

Fig. 3. Plan of an arcade of eccentric shape to show suggested arrangement of the fittings; lining-up the troffers with the glass would give a muddled effect. The arrows show the direction of gaze of observers.

simple display expedient is to divide the window into two parts by a partition, thus making it, in effect, two windows arranged back to back.

(4·7) Open-backed Windows

Perhaps the most striking development in window design in recent years is the open-backed window, which raises such problems as the concealment of window lighting equipment from customers inside the shop, the appearance of the interior lighting when seen from the outside, and the increased likelihood of bad window reflections during daylight hours.

The problem of concealment of window lighting fittings from customers inside the shop is essentially the same as that discussed in the paragraph on island windows and can be solved by means of an inner pelmet or a louvred ceiling. Two other possibilities are to mount filament lamps, usually of the reflector spotlamp type, in metal housings below the soffit, or to instal small lighted showcases glazed at back and front,

in the window opening, which while making for concealment of the lighting fittings, obviously restricts the size of the merchandise which can be shown in them. Such showcases are usually lighted by means of tungsten filament lamps recessed into the soffits, but there have been several successful examples of the use of fluorescent lamps above egg-box louvres (Fig. 4).

A shop with an open-backed window is, in effect, open to the street and must be designed to look attractive from it (Fig. 5). Certain types of lighting fittings, such as the familiar opal glass spheres or reeded acrylic plastic fluorescent fittings which are well suited to a room of normal proportions, become glaring and unsightly when seen from a distance. Grocers', butchers', and fishmongers' shops frequently display this fault, and furniture dealers seem to make a standard practice of mounting fluorescent fittings parallel to the street, so that they become the most conspicuous objects in the field of view, instead of aligning the fittings with the main axis of the shop. Another common fault where open-backed windows are concerned is that fluorescent lamps in cornices, on the back and side walls, although adequately screened from inside the shop, can often be seen over the lip of the cornice when viewed through the window (Fig. 6).

(4.8) Window Reflections

The problem of daylight reflections in shop windows cannot be solved entirely by the lighting, although some improvement can sometimes be effected by this means. All glass reflects some of the light that falls upon it so that unless, as in the case of a "non-reflecting" window, the surface of the glass is so arranged that only a black surface can be reflected into the observer's eyes, some images of objects in the street are bound to appear. How conspicuous they are will depend partly upon the reflecting properties of the glass and partly upon the brightness of the objects themselves. If, for the sake of argument, we assume that plate-glass reflects 8 per cent. of the light which falls upon it at an angle of 90 deg. to its surface, it will be seen that the reflection of an object having a luminance of 100 ft.-lamberts will be 8 ft.-lamberts (100 ft.-lamberts is very low for daylight conditions; a white concrete wall, for example, with a reflection factor of 45 per cent. would have a luminance of well over 2,000 ft.-lamberts on a sunny day). If the reflection factor of the window backing and the merchandise is low it is obvious that a great deal of light will be needed before its luminosity is so high that the window reflection is not noticeable. The dark wood panelling so often seen in outfitters' windows may not reflect more than 20 per cent. of the light falling upon it, so that an illumination of at least 40 lm./ft.^{2} is needed before it will become as bright as the reflection, and about 10 times that illumination will be necessary completely to swamp it. Obviously the background should be as light as is practicable. Where there is no window backing the interior of the shop is bound to provide rather a dark background; for this reason it is recommended that open-back technique should not be used in situations where strong daylight reflections are to be expected. If it is felt to be essential to dispense with a window backing, it is usually worthwhile to provide a temporary screen, curtain or white blind which can be put in place when reflections are especially bad.

(4.9) Coloured Light

Coloured light has long been used in shop windows but the absorption of light by the colour filters, which were essential when filament lamps were the only light sources available, tended to make it uneconomical owing to the high wattages necessary to produce an effective brightness. The introduction of coloured fluorescent lamps has led to a revival of interest in this form of display lighting and a great many examples of coloured background lighting may now be seen. The merchandise in the foreground is picked out by means of filament lamps and it is important to confine the white lighting to the front part of the window, since too much spill of

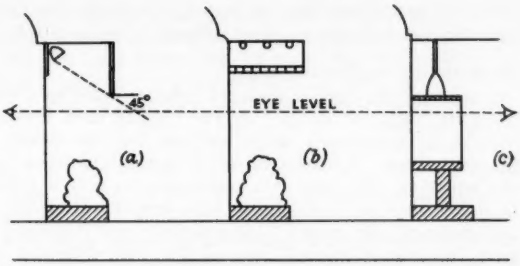

Fig. 4. Three methods of concealing lighting equipment in an open-backed window: (a) an inner baffle of plywood or hardboard, (b) lamps above a louvred ceiling, (c) an inner showcase lighted by lamps in housings recessed in the soffit.

Fig. 5. A small open-backed shop showing how the interior lighting should be designed to be seen from the street. Lighting above the louvred panel is from colour-matching fluorescent lamps and 150-watt reflector lamps.

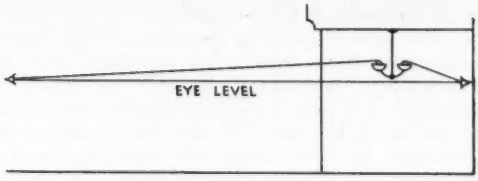

Fig. 6. Diagram showing how an indirect fitting which conceals the lamps from people in the shop can allow them to be seen by observers outside the shop.

light on the background destroys the coloured lighting effect. Flooding the whole window with coloured light often produces rather a crude effect and distorts the apparent colour of the goods. Here two schools of thought are commonly found among shopkeepers, for to some it is almost an article of faith that goods should be presented in as close an imitation of "natural" lighting as possible, while others maintain that since coloured lighting is used mainly at night, when customers cannot go in and buy goods "from the window," it does not matter very much what colour an article appears to be so long as it is attractive. Very few people, they assert, can "carry" a colour in their mind's eye for more than a few moments, so that it is only necessary for an impression of colour to be produced. This conception is more

closely allied to the idea of prestige windows common in America than to the more usual British insistence upon "selling" window displays.

(4.10) Decorative Features

Individually lighted features in shop windows often take the form of small showcases or "shadow boxes" as the display men rather surprisingly call them. They may be of almost any shape and size but are almost always illuminated by tungsten filament lamps. Clusters of small decoration lamps are occasionally used, especially at Christmas, and here it is interesting to note a tendency to use clear lamps rather than the coloured type which was almost universally employed before the war. In this category, too, comes "black light," very popular a few years ago but now seldom seen in shop windows because of the difficulty of obtaining sufficiently dark surroundings to make it effective. The remarkable impetus given to the manufacture of fluorescent media by the introduction of the types of paints, inks and dyes designed to fluoresce in daylight may, however, lead to a revival of this effect.

(5) Technique and Methods: Interiors

(5.1) The Choice of General or Localised Lighting

The question whether it is best to provide a fairly high level of general lighting all over a shop, or to localise the lighting on display areas and counters, relying upon the spill of light to illuminate gangways and floor areas, is still largely unresolved. The type of lighting employed depends very largely on the class of merchandise and of customers, and on the general design of the interior of the shop, so that it is extremely difficult to generalise on this matter, but there is a trend in the direction of localised lighting in the more exclusive drapers', milliners' and shoe shops, whilst all food shops and most furnishers rely mostly upon general lighting. Where localised lighting is employed, it frequently takes the form of strong down lighting from filament lamps, fluorescents being reserved for lighting showcases and small partially enclosed displays; general lighting schemes, on the other hand, are nearly always effected by means of fluorescent lamps, and filament lamps, if used at all, will be used for spot-lighting special displays. The colour-rendering of the earlier types of fluorescent lamps tended to prejudice many shopkeepers in favour of filament lamps and, although a great deal of progress has been made in the direction of improved colour rendering of light sources, this prejudice dies very hard.

(5.2) The Choice of Light Sources

The colour-rendering properties of light sources are, indeed, far more important inside most shops than in the windows, for it is there that customers appraise the goods closely, and do not rely upon the general effect as seen in the window. The suitability of a lamp for lighting merchandise depends not only on the colour rendering properties of the light but also on the degree of sparkle, sheen or high lighting it produces. For this reason tests made by groups of shopkeepers cannot be regarded as having any absolute objective value, but they are useful as indicating the opinion of people who are used to assessing the particular goods in question and know what qualities will most appeal to customers. It is, for example, generally held that filament lamps provide a good "selling" light for almost all types of mechandise, but in a great many cases their main appeal is not due to their spectral quality but to the "liveliness" of the light they emit, as compared to the "flatness" of fluorescent lamp light. In many such trials the addition of a little filament lighting to a display basically lighted with Colour-Matching lamps was often more cordially approved than the use of either lamp by itself and, although it is too early yet to have made many tests with de Luxe Warm White fluorescents, either alone or with tungsten filament lamps, it seems reasonable to suppose that similar results will be obtained. A mixture of filament lamps and either Colour-Matching or de Luxe fluorescent is likely to prove

the favourite choice for almost all classes of merchandise, and it also seems likely that where fluorescent lamps are used in plastic or louvred fittings and the lighting intensities do not exceed 20 lm./ft.², de Luxe lamps will be most acceptable, while in installations where false laylights are used to give the effect of natural lighting, and where an intensity above 50 lm./ft.² is provided, Colour-Matching lamps will be regarded as absolutely necessary.

(5.3) Recommended Light Sources for Various Trades

The suggestions in Table I, based partly on tests made by the E.L.M.A. Lighting Service Bureau and partly on the experience of individual traders, may prove useful. In most cases, where a mixture of Colour-Matching fluorescent and filament lamps is suggested. it is recommended that about equal wattages of each type of lamp should be installed.

Table I

Recommended Light Sources for Various Trades.

Type of Shop	Type of lamp
Baker	Filament or ' de luxe warm white ' fluorescent or both.
Butcher	' De luxe warm white ' fluorescent and filament.
Café or restaurant	Filament or ' de luxe warm white ' fluorescent and filament.
Chemist	Filament and ' natural ' fluorescent.
Confectioner	' Colour-matching ' fluorescent and filament or filament or ' de luxe warm white ' fluorescent.
Draper	' Colour-matching ' fluorescent and filament.
Fishmonger	Filament or filament and ' de luxe warm white ' fluorescent.
Furrier	High intensity ' colour-matching ' fluorescent and some filament.
Furniture	Filament or filament and ' de luxe warm white ' fluorescent on polished wood ; ' colour-matching ' fluorescent and some filament on soft furnishings and carpets.
Greengrocer	' Colour-matching ' fluorescent and filament or filament or ' de luxe warm white ' fluorescent.
Grocer	Filament or ' de luxe warm white ' fluorescent and filament in Southern England, or ' colour-matching ' fluorescent and filament in the North.
Hairdresser	' Colour-matching ' fluorescent and filament or filament or ' de luxe warm white ' fluorescent for general lighting ; for tinting and dyeing either a ' colour-matching ' unit containing two special 40 watt blue fluorescent and two 100 watt filament or equal wattage of ' colour-matching ' fluorescent and filament.
Jewellers	Filament or filament and ' de luxe warm white ' fluorescent.
Leather goods	Filament or filament and ' de luxe warm white ' fluorescent.
Paint and wallpaper	Filament and either ' colour-matching ' or ' de luxe warm white ' fluorescent.
Shoes	Filament and ' colour-matching ' fluorescent or ' de luxe warm white ' fluorescent or filament.
Sports goods	' Colour-matching ' fluorescent and filament.
Tailors and outfitters	' Colour-matching ' fluorescent and filament on sports wear, filament and ' de luxe warm white ' fluorescent on evening and formal clothing.
Tobacconists	Filament or filament and ' de luxe warm white ' fluorescent.
Wool shops	' Colour-matching ' fluorescent and some filament.

Fig. 7. An example of the technique of wall lighting to give a sense of space and to highlight displays. Note the use of dark ceilings.

(5.4) The choice of Direct, Diffusing or Indirect Lighting

Just before the war, there was a strong movement in favour of indirect lighting in shops but, in spite of the introduction of fluorescent lamps whose high efficiency lends itself to this form of lighting, there have been very few such installations in recent years. This is largely because the soft shadowless light from such a system gives too flat an effect, and also because far too much prominence is given to the ceiling, which by this means becomes the most brightly lighted part of the shop. Where indirect lighting is used to-day, it normally plays a subordinate part, being utilised to relieve the darkness of a ceiling through which portholes allow direct down lighting from filament lamps. Diffusing fittings are often used, and here care must be taken to avoid the cumulative glare which results from a long row of filament lamp spheres or of reeded acrylic plastic fittings seen in perspective. Orientating such fittings so that they are in line with the major axis of the room is often the simplest cure for this fault.

Down-lighting with no upward component, a practice normally condemned by illuminating engineers, is quite commonly found in shops, and is often very effective.

(5.5) Dark Ceilings and " flexible " Lighting Installations

As stated previously it is becoming quite common to find shops in which the ceiling is deliberately darkened to heighten the dramatic effect of strong down lighting, usually from filament lamps recessed in porthole or " eyeball " fittings. Occasionally,

Fig. 8. Lighting from filament lamps mounted above the counters is effective but care must be taken to align the fittings with the front edge of the showcase.

part of a ceiling may be painted or papered to match the walls, with "porthole" lighting picking out small displays of merchandise. Where, as in a basement department of a small store, there is a low ceiling much intersected by beams, pipework and other unsightly features, it has been found more economical to paint the ceiling black or dark blue and to provide strong down lighting, usually from louvred fluorescent fittings mounted flush with the lower surface of the beams than to install a false ceiling. A further advantage of the black ceiling technique over the use of a false ceiling is that by this means the oppressive effect caused by the latter is largely obviated. Some designers claim that darkening the ceiling helps to draw attention to the display, and this is to some extent true. It is necessary, however, to provide strong display lighting, especially on the walls, if this result is to be achieved.

"Flexible" lighting installations, where fittings are mounted on a metal or wooden grille suspended from the ceiling and arranged so that they can readily be moved about, have appeared in a few shops, but they are really more suitable for very large stores than for smaller shops and the usefulness of this method seems open to question.

(5.6) Wall Lighting

Deliberate lighting of wall surfaces, as distinct from relying on spill light from ceiling fittings, has been a marked feature of a number of shops in recent years. This can be achieved by means of fluorescent lamps mounted in hollow metal pillars standing clear of the wall, or behind plaques of opaque material on which is mounted merchandise which is itself usually spotlighted from the ceiling. The low level background lighting makes the walls softly luminous and produces a spacious effect. (Fig. 7.)

(5.7) Counter Lighting

Whilst internally-lighted showcase counters are still very much used, there has recently been a vogue for illuminating them by means of lamps suspended above. This has the merit that goods placed on top of the counter are likely to be more brightly lighted than those inside it, but careful placing of the light sources is necessary to avoid unpleasant reflections of the lamps and equipment in the top glass of the counter. (Fig. 8.)

Tungsten filament strip lamps are still very largely used inside counter showcases, chiefly because of the colour of the light they emit, though prime cost and ease of wiring are contributory factors. The first reason is largely discounted by the introduction of the de Luxe fluorescent lamps, which seem likely to meet a

long-felt want. Wall showcases, curtains and similar devices also are often lighted by filament lamps—possibly to save the initial cost of control gear. Here the filament lamp ballast system (see 7.2) has much to commend it.

(6) Survey of After-hour Lighting

(6.1) General Remarks

When the lighting restrictions were first lifted many shopkeepers, who before the war had lighted their windows after hours, seemed disinclined to resume the practice, but in recent years a very considerable increase in after-hour lighting has occurred. During the winter of 1949-50 the author surveyed after-hour lighting in six shopping centres, viz., Oxford Street and Regent Street in London; New Street, Corporation Street, Bull Street and High Street in Birmingham; Clarence Street in Kingston-on-Thames; George Street, the Quadrant and part of Hill Street in Richmond, Surrey; and Grainger Street and some surrounding streets in Newcastle-upon-Tyne. The same streets were again surveyed this year and some quite interesting results obtained, which are given in Table 2.

Apart from the obvious increase in the actual lighting of windows shown in this Table it is interesting to note how in all but one case the percentage of shops using both filament and fluorescent lamps has increased very considerably. In the one exception—Newcastle, it has actually decreased, which suggests that in that city the example of the more progressive firms was followed reluctantly by the rest, who felt that if they *must* light their windows it should be done as cheaply as possible. Another factor which may have affected this, too, is that in shopping centres ministering to the lower income groups, fluorescent or filament lighting only tends to be in the ascendant. It will be noted that in Oxford Street and in Kingston-on-Thames the distribution of the three main classes of lighting is very much the same, while in Regent Street, where the standard of display is very much higher, a mixture of filament and fluorescent lamps is quite the commonest arrangement. In Richmond, a typical middle-class residential suburb, filament lighting predominates, while the percentages of fluorescent and mixed installations are closely comparable. It is, perhaps, of interest to note that in all cases, cold cathode or other installations (including mixed high-pressure mercury and tungsten lighting) are on the decrease.

(6.2) The Effect on Window Lighting Techniques

After-hour lighting can materially affect window lighting technique since its emphasis is bound to be more on making an attractive picture for the more leisured observer than on offering goods for immediate sale. Not only must the display be sufficiently emphatic to impress itself upon the observer's memory, but the whole window must have a strongly individual character so that he remembers in which store he saw it. In addtion, the lack of daylight, with its general "flattening" effect, makes it possible to use spotlighting and floodlighting effects which would be useless during ordinary shopping hours. This partly explains the great increase in the combined use of filament and fluorescent lamps which is clearly apparent in the survey, and also the very marked tendency towards the use of spotlights and other dramatic lighting methods which have been so much on the increase in recent years.

(6.3) Its Incidence in Different Trades

That certain trades are more likely to light their windows than others was also clear from this survey. Since the surveys were made in main shopping areas, certain classes of shops—jewellers, drapers (in which were included large departmental stores), gown shops, tailors and outfitters and shoe shops—have perhaps gained undue prominence at the expense of the essential goods type of shops—butchers, bakers, grocers, and greengrocers—which are usually found in the smaller local shopping centres, and certain specialised types, such as cycle shops and tool shops, which are almost

Table 2

The Increase of After-Hour Lighting in Six Main Shopping Centres Surveyed in the Winters of 1949-50 and 1953-54.

	Number of premises surveyed		Number of windows surveyed		Lighted premises per cent.		Lighted windows per cent.		Tungsten lamps only per cent.		Fluorescent lamps only per cent.		Fluorescent & tungsten per cent.		Cold Cathode & others per cent.	
	1950	1954	1950	1954	1950	1954	1950	1954	1950	1954	1950	1954	1950	1954	1950	1954
Regent Street	132	126	309	422	58	97	68	95	79.5	27	17	21	3.5	46	—	6
Richmond	110	117	227	295	30	58	28	71	94	46	6	27.5	—	26.5	—	—
Kingston-on-Thames	67	97	208	386	33	72	51	85	95	32.5	5	34	—	32.5	—	1
Birmingham	166	136	656	416	45.5	84	58	83	73	56	22	24	2	20	3	—
Oxford Street	202	218	1044	949	58.5	70	77	86	55	25	27	29	8	39	10	7
Newcastle-upon-Tyne	70	61	247	130	54	75.5	69	85	47	47	22	27	17.5	15	13.5	11

Fig. 9. After hour lighting of a fish shop. Filament lamps in mirrored-glass reflectors are mounted above the refrigerated showcase.

always located in working-class areas. It is of interest in this connection to note that none of the butchers, fishmongers or florists lighted their windows and only two grocers and fruiterers did so. This is undoubtedly partially due to the perishable nature of the goods displayed, but the author knows of at least three fishmongers who now display their goods after dark in lighted refrigerated showcases (Fig. 9). The most impressive increase has occurred in shops forming part of the clothing industry, the number of gown shops using after-hour lighting having increased from 56.5 to 91.5 per cent., shoe shops from 46.5 to 85 per cent., and tailors and outfitters from 67.5 to 93.5 per cent. Other trades show a less obvious increase but it is encouraging, if for no other reason than the general brightening up of our streets, to note that some, such as booksellers, stationers and photographers, who previously seemed to show a marked antipathy to after-hour lighting, appear now to be in favour of it. Although the majority of jewellers and tobacconists still leave their windows unlighted, fewer do so than formerly.

(7) Lamps and Equipment

(7.1) Reflector Lamps

Until the introduction of the 150-watt internally mirrored spotlamp, shopkeepers and designers requiring emphasis lighting were restricted to the use of general service lamps in various types of reflectors or housings. The first reaction to the 150-watt spotlamp was to use it indiscriminately wherever highlighting was required, but whilst the lamp was only made in one size at mains voltage, it was soon found that although two types of filament were available, there was insufficient beam-control to produce a really satisfactory concentration of light if the lamps were mounted at a normal distance from the display. As a result, it has become common to see lamps placed very close to the merchandise, sometimes concealed in various types of housing or behind decorative baffles, sometimes without any attempt at concealment. The introduction of a 24-volt 150-watt spotlamp with a really concentrated beam makes it possible to pick out comparatively small objects without having recourse to such methods or to the use of a lens type spotlamp, and this type of lamp is likely to become very popular as shopkeepers come to realise its possibilities.

Another potentially very useful lamp which has been recently introduced is the

75-watt reflector lamp, which is exceptionally well suited to showcase windows and locations where the 150-watt lamp is too bulky to be concealed easily. This lamp also lends itself to mounting in elegant housings in the store interior.

(7.2) Filament Ballast Circuits

Fittings incorporating 40-watt fluorescent lamps with special filament ballast lamps are becoming increasingly popular in small shops, largely because, by this means, the initial installation cost of fluorescent lamps can be much reduced. The system has the further advantage that a mixture of light from filament and fluorescent lamps, generally accepted as excellent for the sale of most classes of goods, can be easily obtained. Mounting the ballast lamps in small reflectors or housings and not necessarily in the same fittings as the fluorescent lamps is a step which will obviously have to be made if this system is to enjoy the popularity it deserves. There is no doubt that in a small shop, where capital outlay is necessarily limited, this system has great possibilities.

(7.3) Colour Rendering of Light Sources

The vastly increased use of fluorescent lamps both in shop windows and interiors has led to a very marked dissatisfaction with the colour rendering properties of the light from Daylight and Warm White lamps in particular, while even the Natural, heralded as especially suitable for shop lighting, has aroused unfavourable comment owing to its poor rendering of blues. Colour-Matching fluorescent lamps have become popular in certain trades, notably drapers, haberdashers and men's outfitters, but they are almost invariably used in conjunction with filament lamps, partly in order to avoid the "flatness" associated with all-fluorescent installations, and partly to reduce the cold effect of the light from these lamps. It has been found that where a really high intensity of lighting, in the order of 100 lm./ft.^{2} is provided, this effect disappears and these lamps are recommended in all situations where a close imitation of natural daylight is required. Where, however, light of similar spectral qualities to tungsten filament lamps is wanted, de Luxe Warm White lamps are being more and more often installed, and it is significant that although these lamps were only introduced last spring, they are already being extensively used, especially in the food trade.

It is perhaps unfortunate that lighting engineers have become so preoccupied with the efficiency of light sources that they have come to regard their colour-rendering as of secondary importance. Most shopkeepers are prepared to sacrifice some efficiency in order to achieve a pleasing "natural" colour rendering of the merchandise.

(8) Conclusion

A good shop lighting installation must fulfil three main purposes—it must assist the shopkeeper to sell his goods, it must make it easy for customers to appraise the goods and it must provide a comfortable atmosphere both for customers and assistants. Shop lighting is an interesting, exciting and expanding field for the illuminating engineer, but far too many still treat shops, especially shop interiors, merely as large areas to be lighted. Illuminating engineers can do much to help designers to produce the effects they want by keeping them abreast of the types of lamps and fittings available, and of research into new techniques and methods of presentation. Where they are themselves designing installations they should never allow themselves to forget that a shop has only one function—to sell goods—and the lighting must be designed with this end firmly in view.

Acknowledgments

The author wishes to thank all those who have assisted him in the preparation of this paper, especially Mr. E. B. Sawyer and members of the staff of the Lighting Service Bureau.

Discussion

MR. E. SOMAKE: May I be the first to congratulate Mr. Tate on his most interesting paper? Mr. Tate has served us with a very nourishing cake, filled with varied and delightful ingredients, baked with loving care and cut up into neat and tidy little slices. He then nibbled at each slice, leaving much for us to discuss; but that is not his fault, as time would not have permitted him to discuss more fully so vast a subject.

First of all there is the mirrored reflector lamp, an expensive item with all too short a life. No wonder general service lamps with properly designed reflectors are being used as substitutes—and, as with most substitutes, not so efficiently. When are we going to get reflector lamps of economic value?

Lighting must primarily set off the merchandise, which must look better in your client's shop window than anywhere else. This form of dramatised lighting sometimes makes the shop itself look dull and somewhat cheerless, particularly when combined with dark ceilings. Yet in theory light ceilings detract from the merchandise. I am sure you will want to discuss the best methods of handling this problem.

The open backed shop front has set many problems, the chief being that of reflections. There is no doubt that this type of shop looks at its best after dark and in many cases presents, to the public, daytime reflections of the street scenes or, what is worse still, reflections of competitors' goods in the shops at the opposite side of the street. In theory, sufficient lighting within the window is the answer, but this is impossible in practice.

Mr. Tate suggests lighter backgrounds, and this helps but does not provide a complete solution. This point would be worth further discussion.

In America there is a growing tendency to cut out daylight from the interiors of stores and so depend entirely on artificial lighting. After all, daylight is a very variable thing. But electricity is cheap there and unfortunately the opposite is the case here. Also lighting, particularly the tungsten variety, generates heat, so it is not to be wondered that clients in this country favour the introduction of as much daylight as possible into the interior. Is this a good or a bad thing?

The colour rendering of the light source is a neglected factor in the fluorescent lamp. The lamp manufacturers are doing all they can to solve this very ticklish problem, but tungsten is still the accepted artificial light, and until fluorescent can give the same colour rendition it will cause dissatisfaction. Perhaps discussion will show that in many cases colour is not as important as is being made out.

These are only a few points I have picked—no doubt there will be many more to discuss before we leave to-night.

MR. E. LUCKING: As a display man I am a user of lighting and try to do all that Mr. Tate tells us.

I do not completely agree with Mr. Tate that an entirely fluorescent installation will give complete flatness. In a large window with vertical fluorescent lamps and fluorescent top lighting we do not get complete flatness, though perhaps the background colour has something to do with it.

I cannot stress overlighted ceilings too much, particularly an overlighted top part of a shop window. We are now lighting the lower regions better than we used to but there is a lot of useful light in the upper parts which some display people tend to underdress. I am very surprised at the number of architects and designers who have put in egg-crate ceilings, which I find always draw my eyes upwards; I am amazed that people can make these faults and use these fittings.

I would suggest that designers should not be afraid of black backgrounds. I would say that you can use dark backgrounds if the display is dramatic and the goods are of high quality—but do not attempt it if you are completely "ham-fisted,"

as it will only be a success if the quality of the goods and the quality of the display are both high.

Incidentally, I wonder if someone can tell me when does a dark ceiling put the ceiling up and when does it bring it down on top of you?

I am glad that Mr. Somake raised the question of daylight. I am all for the total exclusion of daylight as in American stores. When customers can see daylight they always want to take goods over to the windows; if you are going to exclude daylight you must do it totally. One frequently needs to show people buying for abroad what textiles will be like under tropical sunlight. My own firm constructed a special windowless room, but I pointed out that the lighting provided was more like that of an April day in this country than comparable with conditions in the tropics.

DR. H. H. BALLIN: Architects and lighting engineers are agreed that bare fluorescent lamps in the corners of windows are undesirable, causing glare and distracting attention from the exhibits. However, I am afraid that shopkeepers are not necessarily of the same opinion and attempts to persuade them to shield these tubes have not, so far, been too successful. On the contrary, some firms whose windows may be considered exemplary are, I gather, not free from the suspicion that less tasteful and restrained methods might prove more successful.

Shop window lighting, like advertising, may serve a number of different purposes, each of which requires different treatment. In many cases it indicates to the passer-by the availability of certain products—such as cigarettes—and says as forcefully as possible "Stop and buy it here." A measure of violence in colour and positioning of light sources may therefore be understandable and even appropriate. On the other hand, where the window display is intended to raise a desire, hitherto dormant or non-existent, to purchase an article and to purchase it in the particular shop and nowhere else, then the lighting is a vital part of the display and may make or mar the atmosphere which determines the will to buy.

I agree with Mr. Tate that an interesting solution to the problem of shop interior lighting can be the provision of indirect fluorescent coupled with a decorative incandescent fitting. Some examples of this kind were given by M. Claude in his address at the 1954 Summer Meeting of the Society. It is, however, interesting that in Italy there appears to be, at present, a preference for completely indirect fluorescent lighting schemes

The table in Section 5.3 showing the results of tests of colour preference in various kinds of shops is interesting but a little puzzling. In many cases the preferred colour was tungsten with either Colour Matching or Deluxe Warm White fluorescent lamps. These two colours are the extremes of the range of white fluorescent colours and if both are acceptable, it rather seems that a large element of personal taste must enter into the choice. In our experience the Natural lamp, which combines the freshness of the Colour Matching type of lamp with the good red rendering of the Deluxe Warm White, is still a most useful colour either alone or with tungsten lamps.

MR. E. G. WOTTON: There are two questions I should like to ask. The first concerns the feature which I think is called a "leader" and which was shown on one of the slides. The idea behind the feature is to control the flow of customers in a shop. It is made up of a continuous row of fittings or a continuous luminous panel, and must be quite expensive to install. Would Mr. Tate please tell me if the idea of "leaders" actually works in practice: do these expensive features really serve any useful purpose in controlling the flow of customers?

The second question concerns the problem of relighting a store. Supposing I have to relight a medium-size store with fairly large open areas which at the moment is lighted by suspended simple filament fittings, and supposing I have to effect the

relighting without expensive structural alterations. Would Mr. Tate tell me how he would tackle the problem, particularly in view of his dislike of suspended fittings of the commercial type.

MR. JOHN REID: The author states that ". . . the lighting should be designed primarily to set off the merchandise and should not be regarded . . . as an architectural embellishment. . . ." Now there is a fundamental misconception here which I feel is often the cause of misunderstanding between lighting engineers and architects; it is the belief that a lighting scheme can only be either practical or decorative, the belief that these requirements are opposed. But a lighting scheme, or any other part of a building, must be both an architectural feature and a practical scheme if it is to be really successful.

The author also states categorically that only by using expensive special windows can reflections be avoided, but this is not necessarily so. Usually the relative positions of buildings and objects around the shop are known when the windows are installed, and it is often possible to reduce or eliminate distracting reflections by inclining the line of the glass to the street or by sloping it forwards or backwards.

Finally, I would like to ask the author to explain why he finds the glittering chandelier a helpful feature and the contemporary type of fitting with clusters of shades a distraction. What are the relative distraction values of a chandelier and a "Catherine wheel," as he terms the modern fittings?

DR. J. W. T. WALSH: What is done to bring the importance of shop window lighting to the people who are daily concerned with it? Courses on window-dressing are given regularly at technical schools to students who intend to make this and kindred matters their main concern in after life, and it would be interesting to hear what is being done to show them the important part that lighting can play in providing an attractive display.

MR. G. W. CLARKE: In defence of the electricity boards I must take up the remarks regarding the cost of electricity, made by a previous speaker. Electricity is far from dear; indeed, if you compare it with the cost of the goods in the shop window which it is lighting you will find that the latter are usually as much as three or four times their pre-war price, whereas the unit charge for electricity is rarely more than double. Furthermore, most electricity boards offer some form of "off peak" night and day tariff, which is of great benefit to shops and stores as the cost per unit is as low as 0.75d. or less for periods of up to 12 hours per night.

Regarding the choice of colour of fluorescent tubes I agree that this is largely a matter of taste. Personally, I am not greatly impressed by either the Daylight or Deluxe Warm White tubes, but prefer either the New Warm White or 3,500 deg. K White tube as they both produce a cheerful and invigorating light which is neither too cold as in the case of the Daylight or Colour Matching type or too pink and sticky as in the case of the "Deluxe," added to which they are both of considerably higher efficiency.

MR. G. V. MCNEILL: It has been stated by the author that the most popular tube colours for shop window lighting are Colour Matching and Deluxe Warm White.

As these colours represent the extreme blue and red limits of the "near white" tube colours would it not be preferable to use one of each type with a colour-mixing circuit such as that described in last year's meeting on "Applications of Fluorescent Dimming."

Such a system seems to have the advantage of allowing the window dresser to

select the colour of lighting most suited to a particular display, without calling on the services of a maintenance electrician to relamp the fittings.

MR. R. L. C. TATE (in reply): In reply to Mr. Somake, I should like to emphasise that the chief merits of the reflector lamps are their compactness and robustness. They are intended for highlighting rather than for general lighting of windows or interiors; if their initial cost were reduced, it might be possible to use them for a number of other applications. Where ordinary general service lamps are used for highlighting I must emphasise the importance of using them with properly designed reflectors. Both Mr. Somake and Mr. Lucking raised the question of dark ceilings: I think the answer to Mr. Lucking's question is that it is essential to provide plenty of light on the walls, and in a small room the dark ceiling usually gives a feeling of height, in a very large one the opposite feeling may result.

Mr. Somake and Mr. Lucking both spoke of windowless stores. I am sure that there is a very great deal to be said for this idea, especially from the point of view of display, but there is still a strong prejudice in favour of natural daylight, and few managements will forgo what they regard as free lighting for that for which they will receive a bill. Of course natural lighting is not free, as Mr. Jervis showed in his paper in 1948.

The colour of light emitted by fluorescent lamps is not the only important attribute of lighting, sparkle and shadow content must also be considered, and this is why most people use filament lighting as well as fluorescent.

Egg-crate louvering, as Mr. Lucking remarks, can certainly be overdone, but it has its place in certain types of window, especially in those showing a multiplicity of small articles.

Dr. Ballin raised an interesting point about bare lamps. This point of view has been suggested to me before, and at first glance there does seem to be some case for it. I have, however, demonstrated the effect of screening bare vertical fluorescents in my model window to a very large number of shopkeepers, and have never found anyone who did not agree that they were better screened. The majority of bare-lamp installations are put in in ignorance; what, for example, can one think of a shop—there is an example in an exclusive shopping street in London—where egg-crate louvering is used to conceal the lighting equipment, and then bare vertical fluorescent lamps are installed in the corners of the window? Clearly it is a case of muddled thinking.

The recommendations for colours of fluorescent lighting were based on actual tests made by shopkeepers and not on the preference of electrical engineers, and we did not find that the Natural lamp was very popular in these tests. I agree that the results show the influence of personal taste, and I do not think it very surprising that they indicate preferences for the "extremes" of the range. I think shopkeepers, like the rest of us, are about equally divided between those who want as good a match as they can get with natural daylight and those who feel that the colour of the light emitted by filament lamps is the only "artificial" lighting worth having.

Mr. Wotton raised the question of "leaders." They are not often used in this country, but can be very effective in certain circumstances. The second part of his question is not very easy to answer, but I think I should say—concentrate the lighting over the selling areas, use the simplest fittings you can, be careful to keep the brightness of fittings as low as possible and make the greatest possible use of structural features.

I am sorry that Mr. Reid feels that I have given too little emphasis to architectural fitness. I may have expressed myself badly, but I did not mean to suggest that practicality and beauty were mutually opposed, but I do believe that, in a shop, lighting the merchandise is the first consideration and purely decorative aspects should play a smaller part. Where decorative fittings are used, whether they be chandeliers or what, for want of a better word, we must call "contemporary" in design, they should not be

right in the line of vision. I strongly deprecate fussy little lighting fittings at eye-level which become more conspicuous than the goods they are supposed to light.

I have yet to see window reflections successfully eliminated by tilting the glass forward. In all the examples I have seen this only results in a reflection of people's feet, against what is often a bright, white pavement. Tilting the glass back so as to reflect a matt-black canopy, as one does in a "pepper's ghost," might work, but it would be extremely difficult to keep the glass clean.

Dr. Walsh will be glad to hear that lectures for display students are held.

Mr. Clarke has stated the case for the electricity boards very well, but I feel that his personal preference for high efficiency fluorescent lamps may be partly due to his profession. I have found that these lamps are seldom chosen by shopkeepers who have difficulties in displaying their wares under artificial lighting.

Dimming circuits for changing the colour of the lighting in shop windows to suit the merchandise seldom justify their cost. After all, if you want to change the lighting when you change the display, you can do it perfectly easily when you go into the window for that purpose.

The Dow Prize Competition, 1954

Assessors: Mr. A. Douglas Jones, Dr. S. English

Summary of the Assessors' Report

The particular aims of the competition were (a) to encourage architectural students to take a real and intelligent interest in lighting matters, and (b) to encourage co-operation between young architects and young lighting engineers in the planning of lighting installations that shall be aesthetically acceptable and producing desired effects while at the same time complying with the requirements of good illuminating engineering practice.

The essence of the problem put to competitors was: "The layout, lighting, decoration and furnishing of a dining room and cocktail bar in a city hotel. The dining room is a fine eighteenth-century room with an original marble fireplace and with mahogany doors. The floor is made up of deal boards. The dining room faces on to a pleasant open space. The cocktail bar has no particular architectural qualities. Its ceiling, which is lower than that of the dining room, houses the ventilating ducting which is part of an existing plenum system. The position of the intakes and outlets are left to the discretion of the competitors. If desired, the space within this false ceiling may be used for recessing lighting fittings."

Students should look for pointers in the question. Only two competitors, however, reacted to the "fine eighteenth-century room." One of them, though stressing the need to retain the traditional fabric, proposed lighting which did not match the dignity of the room. The other competitor frankly admitted that his modern lighting clashed with the eighteenth-century characteristics of the room and therefore removed the panelling and the original marble fireplace, which the assessors had deliberately put there. The absence of architectural quality in the cocktail bar was a clue for the lighting to be made a special feature to transform a featureless space into a gay and exciting room. Nothing particularly interesting was proposed.

In only one case was there clear evidence that a lighting engineer had contributed to the proposed scheme; this was the only case in which a serious attempt had been

made to design general lighting fittings for the dining room along lines which matched the room itself.

It is indeed a pity that competitors are so ready to jettison common sense in favour of tricks in design or presentation; this attitude to architecture, which is very general, can only lead to moribund building.

Many detailed criticisms of the general layout, decoration and furnishing could be made. As regards layout, a common fault was that the table pattern in the dining room was often quite unrelated to the windows and fireplace; in the bar attempts at informality too often resulted in haphazard arrangements whilst one designed for intimacy was spoiled by fixed seating.

Only one entry made good use of colour. Common faults were using too many colours, and using colours which were too dark and too similar in value. In one case a dark ceiling was used to lower the height of the ceiling, but a mirrored wall was used to increase the apparent length of the room. Mirrors, if used, must be used with great care.

Strong and relatively dark colours for wall and ceiling decoration may look satisfactory in strong daylight, but they effectively kill artificial light unless powerful direct lighting fittings are used, and even then the brightness relationships are unsatisfactory and visually disturbing. If different coloured walls are to be used in a room, colours of different value should be used with a light window wall.

Many competitors overlooked essential practical points. In one bar there was no provision of shelf space for storage of bottles, whilst only one competitor used a patterned carpet which would not easily mark. In designing lighting fittings using conical-type reflectors the size of lamp and need for wiring was completely overlooked.

It is not sufficient to deal with the lighting by saying that it will be provided by filament lamps in spun alloy or pleated paper shades. At the other extreme some of the lighting schemes were so complicated as to be incomprehensible; in one case a suspended ceiling fitting in the dining room completely destroyed the character of the room. The expression of one's moods or personality in the design of lighting fittings or installations needs to be kept well in hand.

The Prize was not awarded.

Additions to the List of Members

The following applicants have been duly elected by the Council to membership in the Society and their names have been added to the list of members:—

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S. H. Heywood & Co., Ltd. ..... *Representative*: H. Price.
2, North Parade, Parsonage, MANCHESTER 3.

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